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**13. ABSTRACT (Maximum 200 Words)**

The breast cancer death rate is high for African American women compared to U.S. national figures and an explanation is that African American women are more likely to be diagnosed with advanced breast cancer disease. Regular mammography screenings reduce the number of deaths from breast cancer by helping to detect the disease at an early stage. Although effective, the number of women engaging in repeat screenings is low, and this is the case for women with a family history of breast cancer. Improving use of mammography screening and subsequently reducing breast cancer deaths will involve an understanding of psychological and neuropsychological factors impacting repeat mammography screenings. This project proposed to evaluate the relationship among psychological distress (anxiety and intrusive thoughts about breast cancer), executive cognitive function (ECF) – cognitive flexibility, and adherence to repeat mammography screenings. Sixty-one women completed background surveys, measures of general distress (Brief Symptom Inventory), cancer-specific distress (Impact of Event Scale-Intrusion) and executive cognitive function (Wisconsin Card Sort Task and Stroop Color Word Test). Regression analyses revealed significant relationships between distress and executive cognitive function. Further, while psychological distress significantly discriminated adherers and non-adherers of mammography utilization, employment status emerged to be the only significant factor in explaining mammography utilization.

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Introduction

Research has revealed that women with a family history of breast cancer experience high levels of anxiety and intrusive thoughts, and that elevated levels of psychological distress may be associated with non-adherence to repeat mammography screenings. One possible explanation for the impact is that elevated distress impairs the higher-order cognitive functions that govern decision making and planning (Executive Cognitive Function) and consequently disrupts behavioral responding. The purpose of the current study is to assess the nature of the relationship between distress and executive cognitive function, and to evaluate the impact of distress and executive cognitive function on repeat mammography utilization among a high-risk African American sample of women. Sixty-one women completed background surveys, measures of general distress (Brief Symptom Inventory), cancer-specific distress (Impact of Event Scale-Intrusion) and measures of executive cognitive function (Wisconsin Card Sort Task and Stroop Color Word Test). Regression analyses revealed significant relationships between psychological distress (Positive Symptom Total) and executive cognitive function. Further, while psychological distress (Positive Symptom Total) significantly discriminated adherers and non-adherers of mammography utilization, employment status emerged to be the only significant factor in explaining mammography utilization in the presence of psychological variables.

Body: Description of Research Accomplishments

This section will describe research accomplishments as they relate to the Statement of Work outlined in the grant proposal.

***Assemble instruments for study (Months 1-3)***

To begin, informed consent was obtained from the Howard University Institutional Review Board (IRB) after the development and submission of the Informed Consent form which was then reviewed, analyzed and subsequently approved by the committee of the Howard University Review Board – the study did not begin until university approval was obtained. Sixty-one copies of the approved consent form were then used for testing with the sixty-one participants. A copy of the approved Informed Consent form was included for review in the initial report.

To prepare for the commencement of the study, the psychological instruments (Brief Symptom Inventory and Impact of Event Scale) and neuropsychological instruments (Stroop Test, Wisconsin Card Sorting Task, Peabody Picture Vocabulary Test) were purchased from Psychological Assessment Resources. Copies of the forms (where necessary) were made to be used by the participants of the study.

A flyer outlining the purpose of the study, characteristics of the target population, location of study and contact information of principal investigator was developed and submitted for approval of the Howard University IRB (A copy presented in first report). The flyer was utilized in the recruitment procedure and included the following: 1) Postings in the Howard University Cancer Center, Howard University Hospital (Department of Radiology, Ambulatory Center, Women's Wellness Clinic, Mammography Center). 2) Submission to local media outlets (Senior Beacon, Washington Informer). 3) Postings as bulletins in local churches and faith-based

organizations including: Mt. Pleasant Baptist Church in Washington, DC; Ebenezer A.M.E Church; Lion of Judah Community Baptist Church; First Baptist Church of Glenarden. 4) Finally, the content of the flyer was presented on local radio stations including (WHUR, WPGC, Magic 102.3, WTOP).

***Screen and recruit study participants (Months 4-7)***

The principal investigator identified first-degree relatives of breast cancer patients by using the following approaches:

a) Letters were sent to first-degree relatives participating in screening programs at the Howard University Cancer Center.

b) Flyers were posted throughout the Howard University Hospital including: Howard University Cancer Center, Department of Radiology, Department of Mammography, Outpatient Clinic, and Women's Wellness Center.

c) Content of the flyer was posted in local print media outlets and this included: Senior Beacon and Washington Informer.

d) The principal investigator attended and handed out flyers at local health fairs and events that involved a health component and these included:

- Howard University Cancer Center Partners in Survival workshop
- 39th Annual Senior Citizen's Day Celebration at First Baptist Church Health Fair
- The Lion of Judah Community Baptist Church Health Fair
- Stone Soul Picnic- Magic 102.3
- Howard University Cancer Center- Mammography Day
- Ebenezer A.M.E Church Health Fair
- First Baptist Church of Glenarden Health Fair
- Howard University International Health Fair

Participants who contacted the principal investigator for permission to participate in the study were screened in order to ensure that they met eligibility requirements. Eligible prospective participants were invited to the Cancer Center to participate in the study at a scheduled date and time.

Finally, a script was developed for use in conducting the study to ensure consistency in the delivery of information to all participants. (Copy presented in previous report). For the current study, sixty-one participants were screened and recruited by the principal investigator.

***Data collection (Months 8-14)***

The final study consisted of 61 participants who were tested; testing entailed the following:

- Completion of Informed Consent
- Completion of HIPPA form (Copy presented in previous report)
- Completion of Background Questionnaire
- Completion of Psychological Questionnaires
- Completion of Neuropsychological testing

The result of each participant's performance was kept in individual file folders and locked in a file cabinet in the Howard University Cancer Center.

The primary investigator did experience some challenges in meeting the suggested N of 112 participants initially proposed in the grant proposal. The investigator exhausted all avenues in order to recruit the full complement of participants including: 1) Attending local health fairs, 2) Attending local churches; 3) Postings in local print media including a major periodical (The Washington Post); 4) Postings in local health care facility, and 5) Radio announcements of the study. However, although the final number of recruited participants was significantly less than the number proposed for the study, the results of the study were not compromised as indicated by positive findings on some hypotheses. Please see Results Section of this report.

***Data analysis (Months 15-19)***

All data for the 61 participants have been entered and analyzed and the results presented and defended at the doctoral defense of the principal investigator.

## RESULTS

Characteristics of the high-risk sample including demographic characteristics and family history of breast cancer are depicted in Table 1.

Table 1. Sample Characteristics

| **Demographic Variables** | **N** | **%** | **Mean** | **S.D.** |
|---|---|---|---|---|
| *Age* | | | | |
| Mean (S.D.) | | | 53.08 | 6.102 |
| *Income* | | | | |
| Less than -20,000 | 16 | 26.2 | | |
| $20,000-$50,000 | 28 | 45.9 | | |
| $50,000+ | 15 | 24.6 | | |
| *Marital Status* | | | | |
| Married | 15 | 24.6 | | |
| Widowed | 5 | 8.2 | | |
| Divorced/Single | 36 | 59.0 | | |
| Never Married | 5 | 8.2 | | |
| *Education* | | | | |
| High school and less | 12 | 19.7 | | |
| Vocational/some college | 26 | 42.6 | | |
| College degree/post graduate degrees | 22 | 36.1 | | |
| *Employment* | | | | |
| Full-time | 36 | 59.0 | | |
| Part-time/Homemaker | 8 | 13.1 | | |
| Unemployed/retired/Other | 17 | 27.9 | | |
| *+Adherers versus Non-adherers* | | | | |
| Adherers | 44 | 72.1 | | |
| Non-adherers | 16 | 26.2 | | |

Table 2 presents the means, standard deviations and ranges for the primary variables of the high risk sample.

Table 2. Means, Standard Deviations and Ranges for Psychological Distress and Executive Cognitive Function Variables (N=61)

| **Psychological and Neuropsychological Variables** | **M** | **SD** | **Range** |
|---|---|---|---|
| Brief Symptom Inventory<br>*Global Severity Index Score* | 0.6328 | 0.324 | 0.14-1.51 |
| Brief Symptom Inventory<br>*Positive Symptom Total Score* | 16.694 | 12.198 | 1.00-51.00 |
| Brief Symptom Inventory<br>*Positive Symptom Distress Index Score* | 1.163 | 0.170 | 1.00-1.65 |
| Impact of Event<br>*Intrusion Score* | 1.875 | 1.594 | 0-5.74 |
| + *Wisconsin Card Sort Task*<br>Total Errors<br>Perseverative Errors<br>Categories Completed<br>Conceptual Level Responses | <br>41.016<br>19.655<br>2.082<br>47.607 | <br>16.747<br>9.664<br>1.394<br>22.591 | <br>13.00-80.00<br>5.00-44.00<br>0-5.00<br>0-88.00 |
| *Stroop Color Word Task*<br>Interference | -6.966 | 6.888 | -26.00-5.00 |
| *Peabody Picture Vocabulary Test*<br>Raw score | 173.918 | 11.732 | 137-194 |

+ Percentage scores are reported for all WCST measures except for WCST-CC where raw scores are reported.

Tables 3 and 4 present mean differences between adherers and non-adherers on measures of general psychological distress, cancer-specific distress, executive cognitive function and cognitive function. On global indices of psychological distress, non-adherers showed greater levels of psychological distress with significant results found in Positive Symptom Total (PST) of the BSI, $t$ (58) = 2.064, $p$ = .04; and Positive Symptom Distress Index (PSDI) of the BSI, $t$ (58) = 1.97, $p$ = .053. A marginally significant result was found on the Global Severity Index (GSI) of the BSI, $t$ (58) = 1.85, $p$ = .069, with non-adherers scoring higher than adherers. Further, no significant differences were found between adherers and non-adherers on cancer-specific distress (IES-I), $t$ (58) = -0.481, $p$ = .632. Finally, no significant differences were found among the two groups on all neurocognitive measures – Stroop, WCST (total errors, perseverative errors, conceptual

level responses and categories completed), *t*'s ranging from -0.238 to 1.342, and p's from .813 to .185.

Table 3. Comparison of Adherers and Non-adherers of Mammography Utilization by Psychological Measures.

| **Psychological Variables** | **Adherers n = 44** | **Non-adherers n = 16** | **P value** |
|---|---|---|---|
| Brief Symptom Inventory *Global Severity Index Score* | 0.59 (0.30) | 0.76 (0.37) | .069 |
| Brief Symptom Inventory *Positive Symptom Total Score* | 14.83 (10.90) | 22.04 (14.52) | .04* |
| Brief Symptom Inventory *Positive Symptom Distress Index Score* | 1.13 (0.15) | 1.22 (0.20) | .053* |
| Impact of Event *Intrusion Score* | 1.91 (1.57) | 1.68 (1.68) | .632 ns |

* $p < .05$.

Table 4. Comparison of Adherers and Non-adherers of Mammography Utilization by Neuropsychological Measures

| **Neuropsychological Variables** | **Adherers n = 44** | **Non-adherers n = 16** | **P value*** |
|---|---|---|---|
| +*Wisconsin Card Sort Task* | | | |
| Total errors | 40.91 (15.22) | 39.75 (20.37) | .813 |
| Perseverative Errors | 19.14 (8.66) | 19.68 (11.15) | .841 |
| Categories Completed | 2.05 (1.31) | 2.25 (1.65) | .621 |
| Conceptual Level Resp. | 47.34 (20.37) | 50.3 (27.87) | .654 |
| *Stroop Color Word Task* Interference | -7.77 (7.43) | -5.06 (5.01) | .133 |
| *Peabody Picture Vocabulary Test* Raw score | 175.09 10.30) | 173 (12.28) | .512 |

* non-significant

+ percentage scores are reported for all WCST measures except for WCST-CC where raw scores are reported

*Hypothesis 1: To Assess the Relationship between Psychological Distress and Executive Cognitive Function*

The next series of analyses were conducted to understand the nature of the relationship between psychological distress and executive cognitive function. Based on patterns of intercorrelations among psychological distress measures and variables assessing varying aspects of executive cognitive function, the items selected to represent global distress were Positive Symptom Total (PST) and Positive Symptom of Distress Index (PSDI) – Measures on the Brief Symptom Inventory; further, the variables selected to represent Executive Cognitive Function (ECF) were Stroop (Interference) and Wisconsin Card Sort Task – Conceptual Level Responses (WCST-CLR). Before assessing relationships among the psychological distress variables and measures of executive cognitive function, intercorrelations among background variables and the variables of interest were assessed and based on their bivariate associations with ECF measures, Age and Cognitive Function – Peabody Picture Vocabulary Test (PPVT) were included as predictor variables in subsequent regression analyses with the intent to control for these variables which have significant relationships with the outcomes of interest. Age was found to be significantly associated with SCWT (I), and Cognitive functioning (PPVT) was significantly associated with WCST-CLR.

A hierarchical regression analysis using PPVT and BSI-PST as predictors with WCST-CLR as the outcome variable revealed a model that explained sixteen percent of the variance in *ECF - abstract concept formation.* Psychological distress in the form of total positive symptoms contributed an additional 7 % of the variance in abstract concept formation when the effect of cognitive functioning (PPVT) is statistically controlled, this is a statistically significant contribution, $p = 0.035$. (See Table 5 below).

Table 5. Summary of Hierarchical Regression Analysis for Psychological Distress Predicting Abstract Concept Formation indexed by Wisconsin Card Sort Task –CLR N=61.

| **Steps and Variables** | **$R^2$** | **$R^2$ change** | **Sig. F change** | **Beta** | **B** |
|---|---|---|---|---|---|
| Step 1:<br>Peabody Picture Vocabulary Test | 0.092 | 0.092 | p =.018 | 0.308 | 0.23 |
| Step 2:<br>Peabody Picture Vocabulary Test<br>BSI-PST | 0.160 | 0.068 | p =.035 | -.261 | 0.22 |

A second hierarchical regression model using Age and BSI-PSDI as predictors with SCWT (I) as the outcome variable revealed a model that explained 20% of the variance in cognitive flexibility (SCWT-I). The measure of participant's average distress

level (PSDI) explained an additional 5% of the variance in cognitive flexibility when the effect of age is controlled and this contribution is significant, p = .055. (See Table 6 below).

Table 6. Summary of Hierarchical Regression Analysis for Psychological Distress Predicting Cognitive Flexibility using Stroop- Interference N=61.

| **Steps and Variables** | **$R^2$** | **$R^2$ change** | **Sig. F change** | **Beta** | **B** |
|---|---|---|---|---|---|
| Step 1: | | | | | |
| Age | 0.148 | 0.148 | p =.002 | -.346 | -.390 |
| Step 2: | | | | | |
| Age | | | | | |
| BSI-PSDI | 0.202 | 0.054 | p =.055 | 0.235 | 9.518 |

Results of both hierarchical regression models used to assess the relationship between distress and executive cognitive function indicate that general psychological distress does have an impact on higher-order cognitive function. The path of impact indicates that an increase in the amount of the psychological and physiological symptoms of distress contributes to subsequent changes in degree of abstract reasoning and cognitive flexibility in responding to environmental changes. Further analyses revealed that the psychological symptoms which may be important in altering abstract reasoning may be the level of phobic anxiety and paranoid ideation which the individual experiences (marginal significance were obtained for these results).

*Hypothesis #2: To Evaluate the Impact of Cognitive and Neurocognitive Factors on Adherence to Repeat Mammography Utilization*

A logistic regression analysis was conducted to ascertain the impact of cognitive and neurocognitive factors on adherence to repeat mammography screening utilization among the high risk sample. Previous analyses (t-tests) failed to demonstrate significant differences among adherers and non-adherers on all neuropsychological measures as well as the cancer-specific distress measure, consequently, IES-I and neuropsychological measures were not included in the logistic model to assess cognitive impact on adherence to repeat mammography utilization.

Significant differences between study groups (adherers and non-adherers) were revealed on two global indices of psychological distress - BSI-PST and BSI-PSDI and therefore both psychological distress variables were selected to assess impact on adherence. Furthermore, correlation analyses among background variables with adherence (in order to control for the impact of these variables) revealed a significant relationship between employment status and adherence to repeat screening and therefore,

employment status, BSI-PST and BSI-PSDI were entered in a stepwise logistic regression model predicting adherence to repeat mammography utilization.

Results of logistic regression analysis indicated that socioeconomic factors ('employment status') emerged to be the only significant contributor to repeat mammography utilization among the high risk sample, $X^2$ (3, N=61) = 9.377, p = .025, [Odds Ratio (OR) = 4.36, 95 % Confidence Interval (CI) = 1.184 – 16.074]. These results indicate that the odds of a person adhering to repeat mammography utilization is 4.36 times higher for someone who reports being employed (whether full or part-time) than for a person who reports being unemployed or retired. Furthermore, both indices of psychological distress (BSI-PST and BSI-PSDI) were non-significant contributors to the prediction of mammography utilization (See Table 7 below). The model as a whole explained 14 – 21% of the variance in mammography utilization.

Table 7. Stepwise Logistic Regression Model with Employment Status and Psychological Distress Variables Predicting Adherence to Mammography Utilization

| Variables | B | Wald | Odds Ratio | P | Confidence Intervals | |
|---|---|---|---|---|---|---|
| | | | | | Lower | Upper |
| Employment | 1.473 | 4.904 | 4.363 | .027 | 1.184 | 16.074 |
| BSI-PST | -.023 | .462 | .977 | .497 | .914 | 1.044 |
| BSI-PSDI | -.2044 | .641 | .129 | .423 | .001 | 19.298 |

## DISCUSSION

The goal of this initiative was to assess the relationships among psychological distress, executive cognitive functioning and repeat mammography utilization among a sample of high risk African American women. Specifically, the intent of the study was to demonstrate a significant predictive relationship between psychological distress and measures of cognitive flexibility (executive cognitive function) and to determine the impact of distress and ECF on adherence to mammography screening.

### Health Practices of High Risk Sample

An important outcome of the current initiative is the fact that adherence to health promotion behaviors among the high risk women is equal or greater than reports of previous studies. In the current analysis, ninety-one percent of the women reported having performed breast self examinations while approximately fifty-six percent engaged in monthly breast self-examinations. These results are consistent with previous studies reporting ninety-two percent BSE among women over the age of fifty years and forty-seven percent reporting engagement in monthly BSE (Lerman et al., 1990, Brain et al., 1999).

Mammography utilization adherence was also a significant finding, as seventy-two percent of the sample reported adherence to repeat screenings. This figure is highly significant as previous reports have reported rates of 10-40% (Mickey et al., 1995 and

Frelix et al., 1999) among African-American women, with the highest adherence rate reported being 81% (McDonald et al., 1999). It is important to note however that in the latter study, the criterion for adherence was 'one-time use of mammography'. In the current analysis, adherence was defined not only as 'having ever had a mammogram' (a criterion used in most studies evaluating adherence) rather adherence was based on several factors: 1) the frequency of mammography screening recommended by the woman's physician (yearly screenings or bi-yearly screenings, etc.); 2) the age of the respondent; and, 3) the degree to which the respondent adhered to the physician-recommended mammography screenings. For a woman of fifty-five years of age, a recommendation of yearly mammograms starting at the age of 40 should indicate approximately 15 mammograms having obtained. Having obtained a minimum of fifty percent of the required number of screenings (eight mammograms), the respondent is designated as having adhered to repeat mammography utilization. It is clear that this criterion is more stringent than those of previous reports and therefore it is even more significant that almost three-quarters of the high risk sample were designated as 'adherers' to repeat mammography utilization. This finding is important as it contradicts previous reports suggesting low mammography utilization rates among African American women.

Psychological Distress and Overall Functioning

In the current study, impairments in two dimensions of the central executive - abstract concept formation and cognitive flexibility, attributed to general psychological distress was revealed. The results suggest that elevated levels of positive psychological and physiological symptoms has a significant impact on forming a concept based on the presentation of abstract data; furthermore, the intensity of the psychological symptoms experienced impacts respondents' flexibility of response to environmental cues - approximately twelve percent of the total variance in executive cognitive function was attributed to psychological distress levels. The obtained relationship between executive cognitive functioning and psychological distress is significant because it provides additional reinforcement for the link between cognitive and emotional status; therefore, clinicians in attempting to intervene with high risk populations experiencing elevated distress must consider both the emotional and cognitive status (most notably cognitive flexibility and abstract reasoning) of respondents in order to develop effective and appropriate clinical interventions.

Although a significant relationship was revealed between psychological distress and executive cognitive function, cognitive status (ECF) failed to differentiate adherers of repeat mammography utilization from non-adherers (as indicated by t-test analyses) thus failing to provide support for the impact of cognitive status on adaptive behavior functioning in the form of adherence to mammography utilization. It is important to note however that failure to reveal a significant impact of higher order cognitive function on adherence to repeat mammography utilization does not imply that other adaptive behavior responses may not be compromised. In fact, previous studies have reported that instrumental activities of daily living (i.e., shopping, taking medications, money management) are impacted by impairment in cognitive flexibility. These activities were not assessed in the current initiative rather a more complex behavioral response system (adherence to repeat mammography utilization) was assessed. One can suggest that

evaluating the impact of ECF impairments on less complex activities of daily living (i.e., adherence to taking medications), may provide support for the impact of cognitive status on functional behavioral responding and such impact may correspond to potential difficulties in the overall adaptive behavior functioning of the high risk woman experiencing elevated distress levels.

Another potential explanation for the lack of significant impact of cognitive status (executive cognitive function) on the measured behavioral response (adherence to mammography utilization) may be explained by considering carefully the ECF construct. The central executive represents a multidimensional construct which is comprised of several subsystems that include but not limited to (self regulation, cognitive set shifting, concept generation, concept execution and reactive flexibility); abstract concept formation and response inhibition are only two of many subsystems which comprise the central executive. It is important to note therefore, that a disruption in only two components of a multi-component and multi-dimensional system may not be sufficient to elicit an overall impairment in a complex behavioral response system (adherence to repeat mammography utilization). In order to fully assess the impact of impairment in ECF on complex behavioral response systems, it is essential that the full capacity of the central executive is captured using a neuropsychological assessment battery with instruments that evaluate the varied subsystems of the central executive. The finding of significant impairment in two dimensions of the central executive (abstract concept formation and response inhibition) attributed to psychological distress does however reveal the potential impact of emotional status on higher order cognitive functions and provide fertile ground for further analyses assessing behavioral impact attributed to elevated psychological distress and impaired executive cognitive functioning.

*Economic Factors*

In order to isolate confounding background variables prior to conducting primary analyses to assess the impact of psychological variables on adherence to mammography utilization, analyses were conducted with variables demonstrated in the literature to be significantly related to mammography utilization adherence (i.e., marital status, income, employment status). Results revealed a significant relationship between employment status and adherence (this relationship further supported by significant group differences between adherers and non-adherers using chi square analyses with non-adherers significantly more likely to be unemployed than adherers); no other background variable was significantly related to adherence.

With significant outcome of psychological distress and employment status variables, a stepwise logistic regression model incorporating these variables was conducted. Results revealed surprisingly that only employment status emerged as the single-most significant predictor of repeat mammography utilization; general psychological distress (PST and PSDI) was not significant in predicting mammography utilization. These results suggest that while the level of psychological distress experienced by non-adherers to repeat mammography utilization may be high relative to adherers to screening, employment status appears to be the single-most important factor determining adherence to repeat mammography utilization in the current high risk sample. In fact, results indicated that the odds of a person adhering to repeat

mammography utilization are 4.36 times higher for someone who reports being employed (full or part-time) than for a person who reports being unemployed or retired.

Results demonstrating the significant impact of economic factors on health care utilization is consistent with previous reports revealing that having moderate to high levels of income in addition to having private health insurance coverage are the most important factors that determine health care utilization among Black women (Mutchler et al., 1991). An additional study revealed that adherence to interval mammography screening guidelines is significantly associated with having higher income (Zapka et al., 1991). In the current sample, almost one-third of respondents (28%) were unemployed; furthermore while fifty percent of non-adherers were likely to be unemployed or retired only eighteen percent of adherers fell within the unemployment category, and while eighty-two percent of adherers were likely to be employed (full part-time) only eighteen percent of adherers were employed. Indeed, socioeconomic status may well be the critical intervening factor highlighting the association between race and health.

Limitations

A number of limitations must be raised about the current initiative addressing psychological distress, executive cognitive function and adherence to repeat mammography utilization. First the sample size is small for the statistical technique conducted. Tabachnick and Fidell (1996) reported that a sample size of $N = 80 + 3m$ (where m is the number of predictors) is required in order to conduct a reliable multivariate regression analysis, this figure equates to approximately 84 participants; the current study consisted however of 61 participants. It is reassuring to note that in spite of the low sample size the study was not significantly compromised as we see significant results obtained in the analysis of hierarchical regression evaluating the relationship between psychological distress (Positive Symptom Total) and two dimensions of the central executive (Abstract Concept Formation and Cognitive Flexibility), with marginal significant results ($P=.070$) obtained on other multiple regression analyses. The marginally significant results may suggest that the outcomes may well be significant with a larger sample size.

A second limitation of the study is the fact that the sample consisted of all African American women which limits the generalizability of the results. There is however a strength to using a predominant African American sample, as specific questions presented in other studies where the African American representation was small, can now be clearly elucidated. For instance, previous studies have indicated low adherence rate among Black women (10% and 40% adherence) in mammography use (Mickey et al., 1995; Frelix et al., 1999), however the current study using a strict criteria for mammography screening adherence reported a moderate-to-high adherence rate with 72% of sample adhering to screening schedules. Furthermore, adherence levels to breast self-examination were high for this group with reports of 92% of respondents reporting having done breast self-examinations.

A final limitation of the study concerns the principle of 'Selection Bias'. The women who participated in the study responded to various advertisements about the initiative – this group of women represents individuals who demonstrate sufficient initiative to respond to the advertisements about the study, and to adhere to the study's scheduled appointments; therefore, these women are perhaps more compliant than the

average high risk woman. As a result, the rate of compliance observed in this sample may not in fact be an exact representation of the average African American woman with a family history of breast cancer.

Key Research Accomplishments for this period

The following lists the key research accomplishments to date:

- Setting up and preparing laboratory for testing including: installing PC version of the neuropsychological test (WCST).
- Recruitment and subsequent testing of sixty-one, first-degree relatives of breast cancer-diagnosed women.
- Analysis of data for all participants tested.
- Submission of abstract for ERA of Hope meeting in June 2005 (See Appendix A).
- Completion of most of dissertation write-up.
- Submission of first draft of dissertation for review by dissertation committee.
- Tentative date for defense of dissertation for June 2005

Reportable Outcomes

- Abstract submitted to ERA of Hope meeting and presentation of results

Conclusions

The current study revealed clinical levels of psychological distress among a significant minority of the high risk sample, with non-adherers experiencing significantly higher levels of depression, feelings of alienation and inadequacy, and physiological complaints. The overall distress experienced by the high risk group was sufficient to impair two dimensions of the central executive - abstract concept formation and response inhibition. This result has implications for clinical interventions for women at risk for breast cancer disease and experiencing elevated levels of psychological distress. Therefore, while the clinician must consider the emotional status of the woman in treatment for anxiety and general distress, the potential disruption in higher order cognitive functions may necessitate use of interventions required for addressing such disturbances.

Although cognitive status (executive cognitive function) did not significantly impact mammography utilization, an assessment of simple instrumental activities of daily living in future studies may reveal an impact attributed to compromised dimensions of the central executive and such an outcome may have significant implications for the overall functional status of this group.

Significant group differences in psychological distress was observed between adherers to repeat mammography utilization and non-adherers, however employment status emerged to be the single-most important contributor to adherence to repeat mammography utilization with results revealing that women who are employed are four times more likely to adhere to screening guidelines relative to non-employed respondents. This result suggests that although psychological distress is indeed a concern for this high risk sample, in the presence of economic concerns, adherence to mammography utilization is best predicted by whether or not the respondent is fully employed.

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**Appendix A**

## COGNITIVE CORRELATES OF ADHERENCE TO MAMMOGRAPHY SCREENING AMONG AN AFRICAN AMERICAN SAMPLE OF WOMEN WITH FAMILY HISTORIES OF BREAST CANCER

Although mammography screenings are effective in reducing breast cancer deaths, not all women with family histories adhere to the American Cancer Society screening guidelines. Research has shown that women with a family history of breast cancer experience high levels of anxiety and that the distress may disrupt the neuropsychological functioning necessary for engaging in regular screenings. In order to increase mammography use and reduce breast cancer deaths, an understanding of the psychological and neuropsychological factors that predict screening non-adherence is essential.

In this study, a sample of 60 African American women have been recruited to evaluate cognitive and neurocognitive predictors of mammography utilization among women with family histories of breast cancer. The women completed a background questionnaire, two psychological instruments and two neuropsychological measures. The cognitive measures assessed general distress and breast cancer specific distress (Brief Symptom Inventory and Impact of Event Scale respectively); the neurocognitive instruments assessed cognitive flexibility and decision making (Wisconsin Card Sorting Task and Stroop Color Word Tests). Data analyzed reviewed adherers versus non-adherers to mammography screening.

Preliminary analyses revealed that there were 43 adherers and 17 non adherers with the mean age at 54.9 years and 47.6 years respectively. Some trends observed include the following: 1) Overall, a larger percentage of adherers perceived worry to be a problem relative to non-adherers (76% versus 60%); 2) A smaller percent of adherers reported disruptions in their daily lives caused by breast cancer worry as compared to non-adherers (24% versus 29% respectively); and 3) More adherers perceived an increased likelihood of developing breast cancer in the future (49% adherers vs 42% non-adherers). Neuropsychological data and some specific psychological data (generalized and cancer-specific distress) have not yet been analyzed. However, the preliminary analyses on some variables seem to suggest differences between adherers and non-adherers of mammography screening among three factors: Perceived worry about breast cancer; Impairment of daily functioning by breast cancer worry; and, Breast cancer risk perception. Further analyses will elucidate specific neuropsychological and psychological occurrences between the groups.